

AMENDMENTS TO THE CLAIMS

The following is a complete, marked-up listing of revised claims with a status identifier in parenthesis, underlined text indicating insertions, and strike through and/or double-bracketed text indicating deletions.

LISTING OF CLAIMS

1. (Previously Presented) An image processing apparatus for converting image data between a raster scan order and a block scan order, comprising:

an image data processor for supplying image data of a raster scan order having a given horizontal resolution and a given vertical resolution;

a line memory for storing image data of a plurality of lines;

an address generating block for converting supplied image data of raster scan order to block scan order by generating a common read/write address for the line memory so that only one line memory is required for performing simultaneous read and write operations, the address generating block including

a block address generator for generating an address of a block which image data is read from and written into;

a line offset generator for providing a line offset between an earlier common read/write address and a present common read/write address for the line memory; and

an address generator including a multiplexer, a next anchor address register, a anchor address register, a common read/write address operator and at least two adders, for generating the common read/write address for the line memory based on the block address and the line offset; and

an encoder receiving image data of the block scan order from the line memory and encoding the received image data.

2. (Cancelled)

3. (Original) The apparatus of claim 1, wherein the encoder is a Joint Photographic Experts Group (JPEG) engine.

4. (Previously Presented) The apparatus of 1, wherein the block includes image data of horizontal-direction pixels and vertical-direction pixels.

5. (Previously Presented) The apparatus of claim 1, wherein the block address generator provides a block offset between a start address of a present block and a start address of a next block for the line memory.

6. (Original) The apparatus of claim 5, wherein the block offset is initially set to 1.

7. (Previously Presented) The apparatus of claim 1, wherein the line offset is initially set to a value defined by the given horizontal resolution divided by a number of horizontal-direction pixels in a given block.

8. (Previously Presented) The apparatus of claim 1, wherein the line offset generator generates a next line offset between a present common read/write address and a next common read/write address for the line memory.

9. (Original) The apparatus of claim 8, wherein the block address and the next line offset are respectively reset at a start of every phase.

10. (Previously Presented) The apparatus of claim 1, wherein the address generator generates an anchor address for the line memory based on the block address, and generates a sequential number of the common read/write address from the generated anchor address.

11. (Original) The apparatus of claim 10, wherein the address generator increases the anchor address to equal the line offset after the address generator generates the sequential number of the common read/write address.

12. (Original) The apparatus of claim 10, wherein the address generator decreases the anchor address to the given horizontal resolution minus one (H-1) when the anchor address has increased so as to equal or exceed (H-1).

13. (Original) The apparatus of claim 5, wherein the block address generator increases the block address as much as the block offset after the block address generator generates the common read/write addresses for a block.

14. (Previously Presented) The apparatus of claim 1, wherein the block address generator decreases the block address to the given horizontal resolution minus one (H-1) when the block address has increased so as to equal or exceed (H-1).

15. (Original) The apparatus of claim 5, wherein the block offset is set to the line offset at an end of every phase.

16. (Original) The apparatus of claim 8, wherein the line offset is set to the next line offset at an end of every phase.

17. (Previously Presented) The apparatus of claim 16, wherein a phase comprises a number of blocks equal to the given horizontal resolution divided by a number of horizontal-direction pixels in a given block.

18. (Original) The apparatus of claim 15, wherein image data having the given horizontal resolution (H) and the vertical resolution (V) comprises V/v phases, wherein v represents a number of vertical-direction pixels in a given block.

19. (Previously Presented) The method of claim 32 wherein generating the common read/write address further comprises:

- (a) initializing a block offset and a line offset;
- (b) initializing a block address and a next line offset;
- (c) setting an anchor address to the block address;
- (d) generating a sequential number of common read/write addresses from the anchor address;
- (e) increasing the anchor address as much as the line offset;
- (f) repeating (d)~(e) until the common read/write addresses for all blocks are generated;
- (g) increasing the block address as much as the block offset;

- (h) increasing the next line offset as much as the line offset;
- (i) repeating (c)~(h) until image data for a number of blocks equal to the given horizontal resolution divided by a number of horizontal-direction pixels in a given block are processed;
- (j) setting the block offset to the line offset;
- (k) setting the line offset to the next line offset;
- (l) repeating (b)~(k) during a time when image data of the raster scan order is supplied.

20. (Previously Presented) The method of claim 19, wherein (e) includes reducing the anchor address so as to equal the horizontal resolution, when the anchor address increase equals or exceeds the horizontal resolution.

21. (Previously Presented) The method of claim 19, wherein (h) includes reducing the block address so as to equal the horizontal resolution, when the block address increase equals or exceeds the horizontal resolution.

22. (Withdrawn) The method of claim 32 wherein generating the common read/write address further comprises:

- (a) initializing a block offset and a line offset;
- (b) generating an anchor address as a function of the block offset, line offset and horizontal resolution;
- (c) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(d) repeating (b)~(c) until the common read/write addresses for all blocks are generated;

(e) repeating (b)~(c) until a block sequence of image data (i) for the plurality of lines (v) has sequentially increased from 0 to v-1;

(f) setting the block offset to the line offset;

(g) setting a remnant obtained as a function of the line offset and horizontal resolution to the line offset; and

(h) repeating (b)~(g) during a time when image data of the raster scan order is supplied.

23. (Withdrawn) The method of claim 32 wherein generating the common read/write address further comprises:

(a) initializing a block offset and a line offset;

(b) initializing a block address;

(c) initializing a line address;

(d) generating an anchor address as a function of the block address, line address and horizontal resolution;

(e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(f) increasing the line address as much as the line offset;

(g) repeating (d)~(f) until the common read/write addresses for all blocks are generated;

(h) increasing the block address as much as the block offset;

(i) repeating (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block are processed;

(j) setting the block offset to the line offset;

(k) setting a remnant obtained as a function of the line offset, horizontal resolution and number of horizontal-direction pixels in a given block to the line offset; and

(l) repeating (b)~(k) during a time when image data of the raster scan order is supplied.

24. (Withdrawn) The method of claim 32 wherein generating the common read/write address further comprises:

(a) initializing a block offset and a line offset;

(b) initializing a block address;

(c) initializing a line address;

(d) generating an anchor address based on the block address and the line address;

(e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(f) increasing the line address as much as the line offset;

(g) repeating (d)~(f) until the common read/write addresses for all blocks are generated;

(h) increasing the block address as much as the block offset;

(i) repeating (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;

(j) setting the block offset to the line offset;

(k) setting the line offset * H/h to the line offset; and

(l) repeating (b)~(k) during the time when image data of the raster scan order is supplied.

25. (Withdrawn) The method of claim 24, wherein (d) includes reducing the anchor address so as to substantially equal the horizontal resolution, when the anchor address increase equals or exceeds the horizontal resolution.

26. (Withdrawn) The method of claim 24, wherein (f) includes reducing the line address so as to be substantially equal the horizontal resolution, when the line address increase equals or exceeds the horizontal resolution.

27. (Withdrawn) The method of claim 24, wherein (h) includes reducing the block address so as to be substantially equal to the horizontal resolution, when the block address increase equals or exceeds the horizontal resolution.

28. (Withdrawn) The method of claim 24, wherein (k) includes setting the remnant to the line offset, when the set line offset equals or exceeds the horizontal resolution.

29. (Withdrawn) The method of claim 32 wherein generating the common read/write address further comprises:

(a) initializing a block offset and a line offset;

(b) initializing a block address;

(c) setting an anchor address to the block address;

- (d) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (e) increasing the anchor address as much as the line offset;
- (f) repeating (d)~(e) until the common read/write addresses for $h*v$ blocks are all generated;
- (g) increasing the block address as much as the block offset;
- (h) repeating (c)~(g) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;
- (i) setting the block offset to the line offset;
- (j) setting a remnant obtained as a function of the line offset, H/h and horizontal resolution to the line offset; and
- (k) repeating (b)~(j) during a time when image data of the raster scan order is supplied.

30. (Withdrawn) The method of claim 29, wherein (e) includes reducing the anchor address so as to substantially equal the horizontal resolution, when the anchor address increase equals or exceeds the horizontal resolution.

31. (Withdrawn) The method of claim 29, wherein (g) further includes reducing the block address so as to be substantially equal to the horizontal resolution, when the block address increase equals or exceeds the horizontal resolution.

32. (Previously Presented) A method for converting image data between a raster scan order and a block scan order, comprising

receiving image data of a raster scan order having a given horizontal resolution and a given vertical resolution;

generating a common read/write address for a line memory of a plurality of lines for performing simultaneous read and write operations using an address generator having a multiplexer, a next anchor address register, an anchor address register, a common read/write address operator and at least two adders;

reading image data of a block scan order from the common read/write address of the line memory;

storing image data of the raster scan order in the common read/write address of the line memory;

converting stored image data of raster scan order to the block scan order; and

transmitting image data of the block scan order to an encoder, the encoder encoding the received image data.

33. (Previously Presented) The method of claim 32, wherein generating the common read/write address is based in part on generating an anchor address, the anchor address representing a segment of pixels of image data that is read from and written to the line memory.

34. (Original) The method of claim 33, wherein the anchor address is generated based on at least one of a block address of a block, of the block scan order, in which image data is read from and written to in the line memory, and a block offset between a start address of a present block and a start address of a next block for the line memory.

35. (Original) The method of claim 34, wherein the anchor address is set based only on the block address.

36. (Previously Presented) The method of claim 35, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address and a next line offset;
- (c) setting the anchor address to the block address;
- (d) generating a sequential number of common read/write addresses from the anchor address;
- (e) increasing the anchor address as much as the line offset;
- (f) repeating (d)~(e) until the common read/write addresses for all blocks are generated;
- (g) increasing the block address as much as the block offset;
- (h) increasing the next line offset as much as the line offset;
- (i) repeating (c)~(h) until image data for a number of blocks equal to the given horizontal resolution divided by a number of horizontal-direction pixels in a given block are processed;
- (j) setting the block offset to the line offset;
- (k) setting the line offset to the next line offset;
- (l) repeating (b)~(k) during a time when image data of the raster scan order is supplied.

37. (Withdrawn) The method of claim 35, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address;
- (c) setting the anchor address to the block address;
- (d) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (e) increasing the anchor address as much as the line offset;
- (f) repeating (d)~(e) until the common read/write addresses for $h*v$ blocks are all generated;
- (g) increasing the block address as much as the block offset;
- (h) repeating (c)~(g) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;
- (i) setting the block offset to the line offset;
- (j) setting a remnant obtained as a function of the line offset, H/h and horizontal resolution to the line offset; and
- (k) repeating (b)~(j) during a time when image data of the raster scan order is supplied.

38. (Withdrawn) The method of claim 34, wherein the anchor address is generated based on the block offset, a line offset between an earlier common read/write address and a present common read/write address for the line memory, and the horizontal resolution.

39. (Withdrawn) The method of claim 38, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and the line offset;
- (b) generating the anchor address as a function of the block offset, line offset and horizontal resolution;
- (c) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;
- (d) repeating (b)~(c) until the common read/write addresses for all blocks are generated;
- (e) repeating (b)~(c) until a block sequence of image data (i) for the plurality of lines (v) has sequentially increased from 0 to v-1;
- (f) setting the block offset to the line offset;
- (g) setting a remnant obtained as a function of the line offset and horizontal resolution to the line offset; and
- (h) repeating (b)~(g) during a time when image data of the raster scan order is supplied.

40. (Withdrawn) The method of claim 34, wherein the anchor address is generated based on at least the block address and a line address

41. (Withdrawn) The method of claim 40, wherein generating a common read/write address further comprises:

- (a) initializing the block offset and a line offset;
- (b) initializing the block address;
- (c) initializing the line address;

(d) generating the anchor address as a function of the block address, line address and horizontal resolution;

(e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

(f) increasing the line address as much as the line offset;

(g) repeating (d)~(f) until the common read/write addresses for all blocks are generated;

(h) increasing the block address as much as the block offset;

(i) repeating (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block are processed;

(j) setting the block offset to the line offset;

(k) setting a remnant obtained as a function of the line offset, horizontal resolution and number of horizontal-direction pixels in a given block to the line offset; and

(l) repeating (b)~(k) during a time when image data of the raster scan order is supplied.

42. (Withdrawn) The method of claim 40, wherein generating a common read/write address further comprises:

(a) initializing the block offset and a line offset;

(b) initializing the block address;

(c) initializing the line address;

(d) generating the anchor address based on the block address and the line address;

(e) generating a sequential number of common read/write addresses as a function of the anchor address and a number of horizontal-direction pixels in a given block;

- (f) increasing the line address as much as the line offset;
- (g) repeating (d)~(f) until the common read/write addresses for all blocks are generated;
- (h) increasing the block address as much as the block offset;
- (i) repeating (c)~(h) until image data for a number of blocks equal to the horizontal resolution divided by the number of horizontal-direction pixels in a given block (H/h) are processed;
- (j) setting the block offset to the line offset;
- (k) setting the line offset * H/h to the line offset; and
- (l) repeating (b)~(k) during the time when image data of the raster scan order is supplied.

43. (Original) An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 19.

44. (Withdrawn) An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 22.

45. (Withdrawn) An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 23.

46. (Withdrawn) An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 24.

47. (Withdrawn) An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 29.

48. (Original) An image processing apparatus for converting image data between a raster scan order and a block scan order in accordance with the method of claim 32.

49. (New) The address generator of claim 1, wherein
the multiplexer sequentially provides a plurality of input values to the next anchor address register;

a sum of a next anchor address of the next anchor address register and an external signal is output from a first adder of the at least two adders;

a difference of the next anchor address of the next anchor address register and a desired value is output from a second adder of the at least two adders;

the anchor address register receives the next anchor address from the next anchor address register; and

the common read/write address operator operates upon the next anchor address to generate the common read/write address.

*** END CLAIM LISTING ***